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Health & Happiness

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26 NOV 1957

LOOK AT THIS MAN

A few weeks ago he was a stone under weight—thin—lacking in energy. Now he is no longer thin but well built, with pounds of healthy flesh, which makes him LOOK better and FEEL better.

IF YOU ARE THIN & SKINNY

You too can build up your body and put on pounds of healthy flesh if you take Vitafos, the famous body builder. Vitafos builds up both men and women. It makes thin, skinny men WELL BUILT & STRONG. It develops flat chested bony women giving them BEAUTIFULLY FORMED BODIES. With it you can gain health, strength and a better appearance.

Send now for a supply of Vitafos, and in a few weeks you will be a different person—no longer skinny—no longer weak, but stronger, well built and with a better appearance. Don't let any failure in the past stop you from taking Vitafos, for it is a REAL BODY BUILDER & cannot fail to give you the extra flesh you need.

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"I have gained 18 lbs. and my appearance has improved"-G. WESTON.

"I weighed only 7 stone when I took Vitafos and now after two months I weigh 9½ stones & feel stronger-" L. PHILLIPS.

Per bottle Rs. 5-50. Three bottles Rs. 15-50
Six bottles Rs. 30. Postage, etc., extra.

Amazing Hair Discovery

Re-grows new hair on bald spots
Restores natural colour to grey hair

Do you suffer from falling hair and dandruff? Are bald patches or grey hair making you look older than you are? The amazing hair tonic Restora brings new hope to all, for it revives healthy hair growth by feeding and stimulating the hair roots giving them the missing elements of nutrition which is the real cause of falling hair, etc.,

Start using Restora and let your mirror prove results. Your hair will stop falling out, dandruff will go, bald spots will be gradually covered with new hair, and grey hair will get back its natural colour.

Per bottle Rs. 5. Three bottles Rs. 14. Postage, etc., extra.

The British Chemical Works
Post Box No. 472
MADRAS-7

BEST QUALITY RUBBER PREVENTIVES

These rubber preventives are the **Best for Family Limitation** because they will not let you down by breaking during use, which often happens when cheap rubber preventives are bought. Further, we send you only **Fresh Stock** and all articles are carefully tested before despatch. So, get your requirements from us and be sure of satisfaction.

AMOUR superfine quality preventives. Specially made for men who want the best. They are extra thin and strong and so soft and fine that they are not felt in use. Will last extra long in hot climates. Guaranteed to be without holes and flaws and not to leak or split when used.

Extra special quality, per dozen Rs. 25, ½ dozen Rs. 13, ¼ dozen Rs. 7.

VELESTRA extra fine quality preventives for men. These are so thin, soft and fine that they are not felt in use. They will not leak or split as they are without holes or flaws.

Doz. Rs. 20, ½ doz. Rs. 11, ¼ doz. Rs. 6.

Neverrip Preventives for men. Good thin quality imported from England. Men who cannot afford the best will find these satisfactory. Dozen Rs. 12. ½ dozen Rs. 6-50.

Silktex preventives for men. Thin quality imported from America. One dozen Rs. 6-50.

Grecian Caps for men. These caps are about 2½ inches long and they cover only the G-P. They allow natural union and yet prevent conception. Doz. Rs. 20, ½ doz. Rs. 11, ¼ doz. Rs. 6.

New Type Preventives for men have a special fitting at the end which is very effective. They are different from French ticklers. Doz. Rs. 25, ½ doz. Rs. 13, ¼ doz. Rs. 7.

F. T.s' For men. These have rubber ticklers at the end and are very popular with men. Doz. Rs. 20; ½ Doz. Rs. 11. ¼ doz. Rs. 6.

Crocodile Preventives for men. These are made with slight ridges like crocodile skin. They will not leak or break and can be washed many times. Superior quality. Doz. Rs. 30. ½ doz. Rs. 16. ¼ doz. Rs. 9.

Dure Sheath for men. Made of fine quality latex rubber. Will not break and will last months in the hottest climate. Can be washed and used many times. Best quality. One Rs. 5, three Rs 14.

SPECIAL SAMPLE PACKET

of 10 different preventives for **Rs. 15.**

We give you here amazing value in this sample packet to prove that you will obtain better value and goods from us. The packet contains the following preventives.

2 Amoura	1 French Tickler
2 Velestra	1 Grecian Cap
1 New type f. 1.	2 Neverrips

1 Crocodile preventive.

Full Privacy. Send value plus Rs. 1-50 postage, etc. (also bank commission if a cheque is sent) and we will be able to send the parcel without our name on it.

Bon Ami check pessary for women. Improved type. Recommended by birth control authorities because it absolutely prevents conception. Three sizes, new superior quality. Price Rs. 7-50 each

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Post Box No. 4[illegible] MADRAS 7, India.

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CURE SKIN ERUPTIONS THRO' THE BLOOD

ZEMRO
BLOOD MIXTURE

CURED THIS PERSON OF SKIN DISEASE AFTER

many ointments and blood cleansers had failed.

READ HIS TESTIMONIAL

Dear Sir,

I had suffered for five years with Eczema on my hands and had tried all kinds of ointments and blood tonics but they did not give me any relief

A friend remarked about the state of my hands one day, and asked me if I had tried Zemro Blood Mixture as it was very good

After three bottles of this blood mixture, my hands are clear of all the sores. I feel that I must recommend your blood tonic to all my friends as it has done for me that which no other tonic or ointment could do.

R. N. BANERJEE,
P. O. Suri, Birbhum Dt., Bengal.

Now Remove Your Skin Eruptions

BY TAKING THE SAME REMEDY

Zemro Blood Mixture is a real blood cleanser, formulated by a Specialist to cleanse the blood of impurities, etc., every time it is taken. It cures pimples, acne, bad skin sores, etc., by removing the impurities causing them. It smashes gout, rheumatism, etc., by freeing the blood and joints of uric acid. It gets rid of leucoderma (white patches) by removing the cause of this disease. That is why Zemro always cures when other remedies fail and why it is the best for you.

Follow the example of thousands of skin and blood sufferers who have cured themselves through Zemro Ignore lesser remedies which will only prove a waste of money. Zemro offers you a sure cure for whatever skin or blood disease you suffer from. Put its efficacy to the test by getting 3 bottles. The good it will do you, will give personal proof that it is a real blood cleanser.

WHEN YOU TAKE ZEMRO YOU ARE ON THE ROAD TO SKIN HEALTH

New improved formula gives wonderfull results

1 Bottle	Rs. 5-0-0
3 Bottles	„ 14-0-0
6 Bottles	„ 27-0-0

If you suffer from any skin or blood disease, write for this free booklet—"**How to Cure Skin and Blood Diseases Permanently.**" It gives full information and the best way to get a lasting cure.

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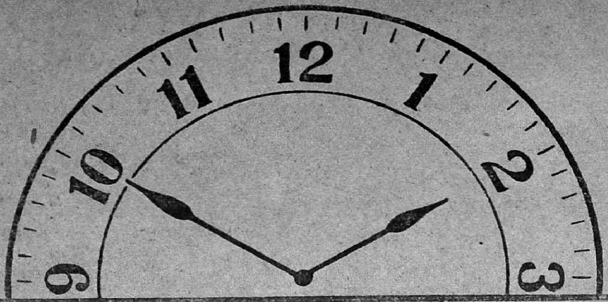

TURN BACK THE HANDS OF TIME

Get back the vigour and strength of your best years

After 40 years of age, sometimes earlier, the glands of your body slows down its manufacture of vital hormones. The result is decreased vigour, reduced vitality, weakness, impaired health, etc.

Vigotone acts directly on the glands of your body and increases their vigour and activity, so that they again produce a full quantity of the hormones needed by the body. Soon your vitality and vigour increases; you feel many years younger and every symptom of weakness disappears. Vigotone is not a temporary stimulant or just another tonic, but a special invigorator for the lasting restoration of vigorous manhood. **It never fails to restore and increase the vital force of the body** and is very good for **loss of vital power, Premature** Aging, **Weakness** and **Debility**.

Try 3 bottles of Vigotone and feel the new vitality and power it puts into you. This will prove to you that it is a real rejuvenator for men.

Read these Testimonials

Mr. J. D. (Calcutta) "......I have taken 12 bottles of vigotone, and I am longer weak and run down. you can publish this if you do not use my name and address........"

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Mr. V. S. (Bombay.) "......my doctor recommended Vigotone to me, and I have been taking it for the last six weeks with good results."

Free Booklet.

If you have lost vital strength and vigour, or if you have noticed symptoms of weakness, write for our free booklet about Vigotone.

Don't let past failures with useless medicines hold you back from a proper cure. Take Vigotone and it will increase your vigour week by week until vigorous manhood is restored.

New improved Vigotone gives very good results. Prices:—One bottle Rs. 7.50 Three bottles Rs. 22; Six bottles Rs. 43 and Twelve bottles Rs. 84, postage, etc., extra. We give a free bottle of special Muscula with every six bottles of Vigotone. Also Vigotone for women. Prices as above.

The British Chemical Works,

POST BOX NO. 472, MADRAS-7. India

NEW SURGERY FOR BAD HEARTS

A simple operation pioneered by a modest Italian surgeon holds out hope for many heart-disease sufferers.

●

OF POTENTIAL importance to many sufferers from heart disease—which causes some tens of thousands to die each year—is an operation recently developed in Italy which gives new vigour to ailing hearts. Technically simpler and less dangerous than an appendectomy, this operation can be completed in less than 30 minutes, and has even been performed under local anaesthesia. Yet complete or partial relief from the pain that accompanies the major types of heart disease has been obtained in nearly 80 per cent of the several hundred operations performed to date.

In the course of a day the adult heart pumps about 15 tons of blood through the body. A small portion of this blood is kept behind to nourish the heart itself and supply its energy requirements. For this purpose the heart has its independent circulatory system—the coronary arteries. The bulk of heart disease traces to clogging of these vital arteries. With age, they often narrow, harden, become obstructed with deposits. Or a branch of the coronary artery system may be stoppered with a floating clot—a coronary thrombosis. When such things happen, the heart is in peril. The resulting chest pains are simply the cry of the hungry heart for more food—more oxygen.

Scores of distinguished surgeons have wrestled with the problem of getting more blood to faltering hearts. They have come up with a number of elaborate and dangerous operations. By and large, only patients in reasonably good health have been able to withstand the drastic surgery. For the new Italian operation, however, age of the patient is not a limiting factor, and even "poor risk" patients have been helped by it. It has been performed with success on patients up to the age of 82, and on patients still in shock from severe heart attacks as little as 48 hours earlier.

The story of this operation begins in 1939 in Genoa, with the work of Dr. Davide Fieschi, a humble and modest physician. Fieschi, studying the maze of blood vessels that feed the heart, became particularly interested in the two internal mammary arteries—drinking-straw-sized arterial pathways that run down through the centre of the chest. He was aware that there was a link between the mammary arteries and the coronary arteries.

If such a link existed, couldn't the flow to the heart be increased by tying off the mammary arteries, Wouldn't the blood, no longer able to flow *downwards* through the mammary arteries, instead back up into the heart, providing a richer supply of nourishment? To Fieschi this seemed a "simple matter of hydraulics." As for the area normally fed by the mammary arteries, blood supply to the chest region is so rich that circulation would be taken up by other blood vessels.

Fieschi tested his theory on cadavers at the University of Genoa Medical School. After pinching off the mammary arteries, he injected various dyes, under pressure, above the pinched spot. Sure enough, the dyes soon showed up in heart arteries. When he injected radio-opaque substances, X-ray pictures showed that they backed up into the heart.

With these experiments behind him, Fieschi started badgering surgeons to try out his theory on a patient. At first leading specialists had no time for him. But finally, after two years, two surgeons

agreed to try the operation or a patient for whom, on the basis of past experience few months of life remained.

The patient had suffered a long series of minor heart attacks, was in almost constant pain. After the operation, all symptoms vanished. There was no more pain, no more gasping for breath. Fieschi published a paper reporting the result.

That was in 1942. No surgeon listened The Second World War was everyone's preoccupation. Fieschi's simple reasoning, and the results on his patient, were filed away and forgotten—not to be rediscovered until after his death in 1952.

In 1953 Dr. Mario Battezzati, second in command of the surgical clinic at the University of Genoa, ran across Fieschi's forgotten paper in the course of research on problems of coronary circulation. But unlike others, he didn't dismiss it. Perhaps Fieschi's talk about "hydraulic principles" made sense. Together with an associate, Dr. Alberto Tagliaferro, Battezzati repeated Fieschi's experimental work—and found that once the mammary arteries were tied off, the blood *did* back up to provide nourishment to the heart. To get some estimate of the amount of this extra nourishment, the two young surgeons devised an experiment. In a dog a heart attack of catastrophic proportions can be produced by tying off one of the two coronary arteries. With the blood supply thus diminished, the animal is left with only half a heart, and may be expected to die within an hour or so. But said Battezzati, suppose the mammary arteries were tied off at the same time?

The two researchers hovered over their "patient" the dog that should have been dead at the end of an hour. Instead, a day passed, and the dog still lived. Then a second, and a third day. By now the animal was up on his feet—wobbly, to be sure, but still alive. The experiment indicated clearly that pinched mammary arteries provided enfeebled hearts with a rather *generous* new blood supply. There were more experiments, and finally the time arrived to step out of the laboratory and into the operating room.

On December 12, 1954, a patient was at hand—a 61-year-old carpenter who had been ill for some time, suffering from high blood pressure and artery hardening Four months earlier a severe heart attack had left him a jobless semi-invalid.

Two days after the operation he was out of bed, walking round his room. Pain had magically vanished; his breathing was improved. On the fifth day he went home. Shortly thereafter he resumed work.

Ten days later the surgical team attempted the operation again, this time on a 59-year-old labourer suffering from angina pectoris. "Immediately after the operation," the surgeons noted, "the patient experienced a sense of complete well-being." Life expectancy for these two patients might normally have been measured in months. Today both are alive, healthy, free of pain.

By November 1955, Battezzati and Tagliaferro had completed 100 such operations in Genoa. Then they moved to the University of Turin where, in the course of a year, another 50 were performed. A recent check gives complete details of their first 70 patients:

Twenty-three per cent achieved, and held, excellent results. All symptoms of disease vanished, and electrocardiographic patterns returned to normal.

Thirty-one per cent got good results; electrocardiographic patterns did not fully return to normal, but breathlessness, fatigue and pain disappeared. and patients were able to resume regular activities.

Thirty-two per cent got results graded as "fair." All noted improvement but reported occasional pain, though less severe than before.

Fourteen per cent were classified as failures, there being no improvement of significance

(Continued on page 9)

CATERPILLAR:

BAD BOY OF THE INSECT WORLD

WITH BOOK and with bell, with candle and Latin, certain caterpillars plaguing a town in southern France were once excommunicated. Or so goes the folk tale. But even this curse of the Church was not enough to drive out the heretical woolly pilgrims—pine processionary caterpillars, who move in single file, head to tail. wreaking destruction throughout the pine forests. So they were summoned to court, to be arraigned on charges of trespass, vandalism and theft. However, the counsel appointed for their defence showed that his clients could not remove themselves in time to comply with the court order, and he was granted a later date for their departure.

Well did all parties to this sly old nonsense know that at the approach of winter the processionaries would hole up in cocoons, to emerge the following spring as harmless moths.

For caterpillars, as every child knows, are the larval stage of moths and butterflies, the childhood of the insect. But what brats they are! They eat and grow prodigiously, getting into anything and everything, leaving havoc behind them. The cabbage white caterpillar, the tobacco hornworm, the cut-worm, the larva of the codling moth and the clothes moth alone cause millions of pounds of damage yearly. On the other hand, from ancient times a great commerce has been built upon the industry of the silkworm All these children of nature are far more important than the adult forms of the same insects, most of which spend their time flitting from one nectar-cocktail party to another, pollinating a flower here and there, or frivolling and flirting and promiscuously mating.

A butterfly, like all other true insects has six legs. A caterpillar goes two or five pairs better. With these it ripples along on its mighty marathons, for it has a system of muscles that, in proportion to its size and weight, make it an Olympic champion. But some caterpillars, you will have noticed, move by humping or looping. That is because the middle pairs of legs are missing or undeveloped.

Caterpillars have a heart that keeps the yellow or green "blood" moving sluggishly, but no lungs; instead, pores on their bodies connect with a network of tubes and so aerate the blood. There are a crop and gut—trust these greedy creatures for that. And jaws, tireless jaws, that move sideways, not up and down like ours. Primitive sense organs, which will become the eyes of the adult insect, can distinguish light from dark. Apparently without ears, caterpillars move in a silent world, deaf even to their own constant munching. But they have a delicate sense of touch all over the body.

Concentrations of nerves into a series of ganglia make up the brain centres of a caterpillar. Here nerve messages are received, and orders to the muscles dispatched. How stubbornly these orders may be carried out was shown by the great Provencal student of insect life, J. Henri Fabre. He set up a group of pine processionary caterpillars on the rim of a large flower pot, besibe which he laid a branch of pine, their favovrite food. It would have been easy for the caterpillars to reach this; instead they crawled round and round the rim for seven days.

The reason for this apparent idiocy was, from the caterpillar point of view, a sound one. These creatures, like spiders, are spinners, and each processionary as he went, laid down a thread of silk for a guiding path. The threads formed a track the crawlers could not bring them selves to leave; they became prisoners of the game of follow-the-leader. Call it instinct or reflex, the persistence is a driving force with which a caterpillar is born.

To get born, the caterpillar eats its way out through the shell of its egg. Usually the egg has been laid on the caterpillar's favourite food plant so that the little glutton can immediately fall to. Or, with some species, if food is not at hand, the caterpillar quickly drops off its birthplace by paying out a silken rope and crawls off to seek what it may devour.

Young Master Caterpillar looks a tempting titbit to many a bright bird's eye. So some wary kinds of caterpillar feed underground or at night. Others are protected by a thick coating of hairs many of which carry an irritant like that of nettles. Blown on the wind when the caterpillar sheds them, these hairs can cause a rash on people who never met the creature.

Even the hairless caterpillars have their ways of surviving. Many of them look like bare, dead twigs on the trees, having the same colour, holding themselves at just the same angle of growth as real twigs. Others have a flavour disagreeable to the palates of their enemies. The puss moth larva can put on a false face by pulling down an extra fold of skin. The result is a furious red "face," two big scary "eyes" and a false, fierce "mouth." Also there emerges from the hindquarters what looks like the forked tongue of a serpent. When disturbed, the caterpillar of the lobster moth rears up on long legs, like an embattled ant, its front pair of legs looking like feelers, while the raised tail segments protrude false "stings." Whether or not enemies are frightened by such displays is a question. Certainly the easiest animals to fool are the ones with the most imagination—ourselves.

While many of these underworld characters cost us millions, nature has her own way of eliminating them. I remember an influx of caterpillars into my neighbourhood when I was a boy. The community was preparing an attack upon them with poisons and burning when a great flock of warblers came through on their seasonal migration and soon there was hardly a caterpillar to be seen,

As a boy, too, I captured the fully grown larva of a Polyphemus moth and put it with some oak leaves in a shoe box in my room. Soon my caterpillar began the restless weaving back and forth of the head that precedes the spinning of its cocoon. The material for this is produced by glands in the creature's head; it emerges as a viscous fluid which upon contact with the air hardens into silk of varying quality. Generally the cocoon is made in three layers: a coarse, loose outer casing, a lining of fine silken floss, and a papery wrapping round the caterpillar itself. In the dark and silence of this retreat it passively under-goes its miraculous transformation.

But in some cases the hand of man interferes, and to great purpose. The silk-worm has been domesticated for at least 4,000 years and not all the drip-dry synthetics yet discovered can rival the sheer or sumptuous beauty of silk.

The silkworm, a creamy-grey caterpillar about three inches long when fully grown, is an amazing little worker: In three days of constant weaving it spins a cocoon from which can be reeled off an unbroken filament up to 1,200 yards long and only 1/1200th of an inch thick. Skilled workers unreel these filaments and twist them into thread.

The cocoons of many moths are lovely little pieces of deceit. The leaf-roller caterpillars snuggle between two leaves so fastened together with silk that the whole looks like one dead leaf twirling in the autumn winds. The black hairstreak butterfly forms a retiring place so like a bird-dropping on a twig that even collectors are deceived. As for the hated clothes moth, its cocoon is a tiny case clinging to the fabric which the house wife may take for a speck of lint.

Within the privacy of its cocoon the caterpillar changes from the larva we knew in its crawling childhood to a pupa —the dormant stage. This has been likened to adolescence, for now occur in secrecy the alterations from child to adult. On the great day of emergence the latent creature finally cuts, or dissolves, or unplugs an opening in its monastic dul l

retreat and crawls out, weak and damp. The wings, crumpled like leaves in bud, slowly expand; their posssesor may wave them many times, drying and sunning them, until at last they are ready for the glory of flight.

Now the primitive sense organs of the caterpillar become the compound eyes of the adult, and for the first time colour is perceived. Orange and red and yellow particularly delight the butterflies. The moths, night flyers for the most part, prefer white blossoms that show up in the dusk. And certain flowers which are especially adapted to pollination by moths open only at night, or exhale their perfume after the sun has set.

For the sense of smell in this winged thing that was a caterpillar is now exquisitely developed. The odour of the female vapourer moth will call the males from afar. Even a spot where she has alighted is enough to send these suitors fluttering round it in a frantic search for her.

Gone is the childish greed of the catepillar. These airy adults live only on nectar, reached even in deep-throated flowers by their long, uncurling tongues. Some there are that never eat or drink at all, but live only to mate.

For such a life they pay a high price—brevity of life itself. Soon their lovely wings, now faded and torn, carry them in a last forlorn flutter to the forest floor. Or the beautiful little triflers drift to lake waters, or are borne away by some stream already chattering with cold. But somewhere, in some right place, the eggs have been laid. The lightwinged mother does not stay to see more. The great circle of life, which has no beginning and no end, is complete.

(Concluded from page 6)

Seven patients had died, one to 13 months after their operations. One died of a stroke, another of diabetes, neither connected with the heart condition. The other five, all of whom had been classified as failures at the time of the operation, died of their heart disease. Thus the score added up that 86 per cent either recovered or obtained varying degrees of relief.

Not long ago, at the University of Parma, where Battezzati is now chief of pathological surgery and Tagliaferro is his assistant, I saw the operation performed. On the operating table was a 54-year-old housewife, under the lightest anaesthesia. At 1.10 a two-inch-long incision was made to the right of the breastbone between the second and third ribs. One inch beneath the surface a small, whitish artery, the right mammary artery, was exposed and tied off with two loops of black silk. By 1.22 the wound was closed and another incision was made on the left side. By 1.34 the left mammary artery had been tied off, surgery completed.

Two days later the patient was out of bed. Three days after that, she went home. "I feel as if a stone had been rolled from my chest," she said.

After the initial successes of Battezzati and Tagliaferro, Dr. Robert Gloyer, one of the United States' leading heart surgeons, reported on his first 77 mammary artery operations. Of the 50 patients who had been followed for from one to five months, 34 got either complete or partial relief from pain. Eleven patients either remained unchanged or showed some temporary improvement. Five died of their disease.

Great though its promise, Dr. Battezzati stresses that the new operation "will not rebuild old, ruined hearts. It does not do away with the need for medical treatments which are of proved value in coronary disease. It will do but one thing: provide better nourishment for the portion of healthy heart muscle that remains."

At least another two years will be necessary before this operation can be finally evaluated. But both Battezzati and Tagliaferro believe that it almost surely will become a surgical milestone. ★

TENDING AN ATOMIC OVEN

"DON'T PICK UP anything you see lying in the street or in the fields," parents, who are employed by the Hanford Plutonium Works, tell their children.

And to underline their prohibition they tell the story of the White Man.

"Once there was a watchman from Richland who found a tool while going his rounds and picked it up and brought it home " It wasn't till the next morning that he noticed that his hands had become contaminated by alpha rays and he ran in fright to H. I. Division. Then the doctors and the watchman's superiors began to dither and to make a great uproar. They drove at once to the little house where he lived with his wife, and children, to get back the tool as quickly as possible.

"But the contagion in it had already spread everywhere: not only the watchman and his family had to go the hospital but also the whole house was sick. So the White Men with the black rubber masks had to be called.

"They ordered the beds, tables, chairs, pillows and in fact everything that could be moved to be taken away and burned. Then they had the paint scraped from the walls, the floors torn up and the kitchen stove dismantled.

"For everything, everything had been poisoned...And if you're disobedient, the White Man will come to us, too, and take all the toys away with him, and the bedroom, the dining room, the kitchen perhaps the whole house..."

The story of the White Man is no cautionary tale invented for pedagogical purposes. It really happened in may, 1951. There are sheaves of documents relating to it in the archives of the Atomic Energy Commission In Richland, the brand-new spotlessly clean town of 30,000 inhabitants—built at the close of the war for the employees of the atomic factory 12 to 25 miles away—fear of contagion through the invisible radiactive particles and rays amounts to an obsession.

In public and continually repeated courses everyone who comes to live in Richland learns the atomic age's alphabet of fear:

Alpha raps. Positive charged helium nuclei emanating from the atom. Cannot penetrate the skin but can do great damage if they enter the body through small open places.

Beta rays. Electrons. Slight power of penetration. Penetrate about a third of an inch through the skin. Great danger of burns.

Gamma rays. Can penetrate from the outside deep into the body.

Nautrons. Danger! Harmful in the highest degree. According to speed they penetrane different depths into the tissue. In the case of strong radiation, internal organs are paralyzed.

A man newly entering the army of nearly a thousand workers in the Hanford area is given, before ever he sets eyes on one of the factories, a four-weeks' course of instruction by lectures and educational films.

Here he is taught that because of the dangers of radiation he will work fussily and slowly. He learns that he will presumably never lay his own eyes upon the dangerous material with which he works, that he may approach the infected caps, screws and other machine parts, if at all, only with special tools a yard long.

But above all, the new man will make th eacquaintance of his guardian angel, who will never leave his side for more than two or three hours during his working time in the plutonium factory. This is the H I. man in white, employee of the Hanford Health Instrument Division, which is responsible for the protection of health in the factory.

To every four persons occupied in the "hot regions" of the work there is at

least one health guardian. He takes many tests a day to find out if any of his proteges may have received more than the tolerable dose of rays. And he places a precise dosier before each day by, week by week, the current data relating to his health are entered.

When the atomic worker, John P. Bryant, comes to the factory in the morning he is handed at the entrance two ionic chambers in pocket form, known as "pencils," and his personal brooch containing a small bit of film sensitive to rays.

First of all he goes into the canteen to deposit his lunch, which he has brought along from Richland. There are no kitchens here because for reasons of safety no food may by cooked or served within the Hanford area. Although the dining hall is far from the atomic ovens, in a "clean region," the tables are inspected at half-hour intervals for the possible presence of beta or gamma radiation. For the most feared and dangeruns form of poisoning is the penetration of small particles into the stomach and intestines during the intake of food.

Now Mr. Bryant goes to the dressing room where he leaves his own clothes, and daily finds in his locker fresh underwear, socks, cleaned overalls, working shoes painted yellow on the tips and heels, a tight-fitting head covering, cellophone-wrapped gloves and protective goggles.

Now he crosses the white line which divides the clean zone from the intermediate zone. Here, at the end of his working period, he will take off his strange uniform to srep naked into the shower room, watched by inspectors and equipped with special disinfectant soaps.

At present the worker does not pause in the intermediate zone but proceeds directly to the hot region whose photoelectric door opens automatically before him. He walks in.

Now he is standing in a high, bare, windowless room known as "the canyon," and waiting for his H.I. man who will make the first control tests to the morning upon him. No sooner is this accomplished than the foreman fetches him and brings him to his place of work.

The John P. Bryant remains alone before a high wall without door or crevice but full of dial plates, pressure gauges, scales on whose finely marked graph paper curves are drawn in variously colored inks.

Now for a few hours the worker will control the implements for control, supervise the instruments for supervision, press buttons, turn wheels or move levers through which, behind the wall many yards thick, radioactive material is being mixed, receptacles emptied, uranium cartridges introduced and expelled.

There, behind the mighty shield, rages an inferno of radioactive rays. To encounter them for a matter of seconds would mean certain, even if creeping, death. Through a loudspeaker attached to a microphone connected inward, John P. Bryant can tell that something is really going on beyond the bare silent wall. Sometimes it sounds like the chirping of crichets in the summer meadows.

At 10:21 during the morning shift John P. Bryant is conscious of something amiss in his atomic oven. The instrument slate pencil on his vibration gauge has crossed the red danger line; the loudspeaker is sending an entirely new melody out of the interior of the burner. It is as though the cricket had associated himself with another animal, as though his little metal tongue were whetting itself angrily against metal teeth.

Bryant immediately notifies the overseer, who after brief inspection applies to Technical Division 200. Canyon 7 of Group S beging to fill with people. Engineers have hastened to the spot. A number of H.I. men are standing in readiness. Bryant's white guardian

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angel wishes to take radiation measurements on him at once and leads him quickly away.

Meanwhile the organization's chain reaction is set going. Word is passed to the emergency station at Richland which, in case of an improbable but not impossible explosion, would take charge of the rescue work.

Twelve minutes later the signal to stop work resounds through the cement gorges of the canyon. The plant, which operates uninterruptedly day and night, weekdays, Sundays and holiday, must be closed for repairs.

Occasional repairs to the machinery are as inevitable in the Hanford Plutonium Works as in other factories. But in the realm of radioactive danger the replacement of a malfunctioning part becomes an awkward and dangerous operation.

No human being can enter the atomic furnace. The defective part must therefore be unscrewed by a remotely controlled grasping implement, and then brought to a scaled region prepared for these occasions.

The preparation of this repair place, which must lie as close as possible to the site of the damage, is the first task of a small special group. It erects provisional walls of leaden tiles, provides for the installation of strong, light fittings and spreads a layer of removable artificial material over the floor which will thereby be protected from contamination. It is on this spot that the grasping tool will lay the faulty piece.

This grasping implement, doomed to remain forever behind the thick walls of the furnaces because of its hopeless radioactivity, is a sort of robot whom the plutonium workers have named "Sweet Hot Dolly"

The master of Sweet Hot Dolly, sitting in his cabin protected from radioactivity, directs his creature in to the interior of the atomic furnace.

Her sensitive electronic "feeling system" discovers an irregularity, a fractured place in the organs of the oven. The master switches on the second of two television sets and obtains by the combination of the two televisors a single three-dimension, solid-looking picture on which a fresh white break in a transmission box is plainly recognizable.

Now the robot hand is guided through the interior of the furnace to a precise spot. For a split second the heavy protective wall soundlessly opens a crack, lets out the object brought by Dolly and shuts again. The defective part is now lying on the repair place in the sealed region.

The repair crew is standing ready. They are four mechanics, a foreman and naturally an H.I. man. They were chosen not only for their abilities but above all on account of their health records. Only workers whose total dose of radiation since they came to Hanford is reasonably slight can be appointed for such a job, in which overradiation is unavoidable even if only for a brief period,

If a damaged part can really not be mended, it must be quickly walled in on the spot. All over the hot zone of the Hanford Works one sees here and there in a room, without any regular arrangement, little molehills of leaden tiles, like prehistoric tombs. The all-too-living atom particles and rays are beating against the walls.

In this ease the repair operation proceeds normally. With instruments mounted on long pliers, the two fitters succeed in mending the breach.

A whistle announces the successful termination of the operation. Only when everyone has moved to safety will Sweet Hot Dolly reach out from within the furnance for the mended part and fetch it back.

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